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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/352,194	07/13/1999	SHUNPEI YAMAZAKI	0756-1998	1911

22204 7590 06/05/2002

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EXAMINER

TOLEDO, FERNANDO L

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 06/05/2002

27

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/352,194

Examiner

Fernando Toledo

Applicant(s)

YAMAZAKI ET AL.

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 5 and 36-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5 and 36-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 26.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Claim Objections***

Applicant is advised that should claims 37, 38, 49, 50, 53 and 54 be found allowable, claims 55 – 60 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

### ***Double Patenting***

Claims 5 and 36 – 60 of this application conflict with claims 1 – 18 of Application No. 09/894,125. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

Claims 5 and 36 – 60 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 – 18 of copending Application No. 09/894,125 in view of Takemura (U. S. patent 5,616,506). The copending Application No. 09/894,125 substantially disclose the claimed invention of the present Application.

However, the copending Application No. 09/894,125 does not recite the limitation "providing the semiconductor film with a catalytic element for facilitating a crystallization of the semiconductor film." Takemura in the U. S. patent 5,616,506; discloses that nickel is added as a catalyst to an amorphous silicon film in order to promote crystallization of the silicon film (column 6; lines 31 – 35).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add nickel to the silicon layer of copending Application No. 09/894,125 because as taught by Takemura it will promote the crystallization of the silicon film (column 6, lines 31 – 35).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 36 – 48, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takemura in view of Zhang et al. (U. S. patent 5,569,610) and Voutsas (U. S. patent 6,071,796).

In re claims 5 and 36 – 48, 55 and 56; Takemura teaches forming a semiconductor film comprising silicon over a substrate (column 6); providing the semiconductor film with a catalytic element (i.e. nickel) for facilitating a crystallization of the semiconductor film (column 6); removing an oxide film 104 from a surface of the

semiconductor film by etching (column 6 and figures 4a – 4d); leveling the surface of the semiconductor film by heating after removing the oxide film (column 7).

Takemura does not teach wherein the semiconductor film is irradiated with a laser light for crystallizing the semiconductor film providing the catalytic element.

However, Zhang in the U. S. patent 5,569,610; show carrying out a first heat treatment of an amorphous silicon film to form a thin film transistor with an excimer laser having a light with a wavelength of 248 nm to crystallize the amorphous silicon (column 5).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a laser as taught by Zhang to crystallize the amorphous silicon of Takemura since Zhang will enable the practitioners of Takemura to heat treat the amorphous silicon film with a laser irradiating UV light.

Takemura in view of Zhang still does not show that the crystallization process is made in the presence of air.

However, Voutsas in the U. S. patent 6,071,796; figures 1 – 3 and related text discloses a TFT crystallization step with an excimer laser in the presence of air because it would be advantageous to improve the quality of excimer laser annealing (i.e. crystallization) polycrystalline silicon films on TFT (i.e. flat panel display) substrates by performing excimer laser anneals in an air ambient at atmospheric pressure, eliminating the need for substrate isolation chambers that have costly quartz windows through which the laser must pass (column 2).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to crystallize the TFT amorphous silicon layer with an excimer laser as taught by Takemura in view of Zhang in an air ambient as taught by Voutsas because it will eliminate the need for substrate isolation chambers that have costly quartz windows through which the laser beam must pass.

In re claims 36, 39, 42 and 45; Takemura teaches that the second heat treatment takes place in a reducing atmosphere that contains hydrogen (column 7). The term reducing atmosphere is interpreted as requiring some atmosphere that contains a reducing agent such as HCl. See In re Zletz, 13 USPQ2d 1320 (Fed. Cir. 1989)(Claims are given their broadest possible interpretation during PTO prosecution). It is noted that the specification does not set forth an explicit definition for what Applicant regards as a reducing atmosphere.

Claims 37 – 40, 43, 44, 46 – 48, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takemura in view of Zhang (U. S. patent 5,569,610) and Zhang (U. S. patent 5,888,857).

In re claims 37, 40, 43 46 and 55; Takemura in view of Zhang (U. S. patent 5,569,610) do not show wherein the leveling process is carried out by heating in an inert gas.

However, Zhang in the U. S. patent 5,888,857; teaches that a second annealing carried out in an atmosphere of an inert gas (i.e. nitrogen) because it will promote further crystal growth (columns 7 and 8).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the leveling process of Takemura in an atmosphere of an inert gas because as taught by Zhang it will promote the crystal growth of the semiconductor layer.

In re claims 38 – 40, 44 – 48 and 56; Takemura in view of Zhang (U. S. patent 5,569,610) do not show wherein the leveling is carried out wherein the concentration of oxygen is 10 ppm or less.

However, Zhang in the U. S. patent 5,888,857; teaches that the leveling process can be done in an environment void of oxygen to prevent the silicon from reacting with oxygen thereby preventing the formation of silicon oxide, which, inhibits further crystallization of the amorphous silicon film (column 7 and 8).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to level the semiconductor substrate by carrying a heating process as taught by Takemura in an environment with an oxygen concentration of 10 ppm or less as taught by Zhang (U. S. patent 5,888,857) to promote further crystalline growth.

Claims 41 – 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takemura, Zhang (U. S. patent 5,569,610) and Zhang (U. S. patent 5,888,857) in view of Ohtani et al. (U. S. patent 6,285,042 B1).

Takemura in view of Zhang (U. S. patent 5,569,610) and Zhang (U. S. patent 5,888,857) do not show using hydrofluoric acid to etch away the silicon oxide layer.

However, Ohtani in the U. S. patent 6,285,040 B1 and related text, shows that it is conventional to remove a silicon oxide film, from a crystalline silicon layer that is used to form a TFT, by using hydrofluoric acid ( $\text{HF}_{\text{aq}}$ ) as the etchant since silicon oxide is very selective to  $\text{HF}_{\text{aq}}$  (column 9).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use  $\text{HF}_{\text{aq}}$  as taught by Ohtani, to remove the silicon oxide of Takemura since it is conventional absent evidence to the contrary to use  $\text{HF}_{\text{aq}}$  as an etchant of silicon oxide.

### ***Response to Arguments***

Applicant's arguments with respect to claims 5, 36 – 60 have been considered but are moot in view of the new ground(s) of rejection.

Applicant contests that HCl is not a reducing atmosphere but an oxidizing atmosphere.

Examiner respectfully submits that HCl in vapor possesses  $\text{H}^+$  ion as well as  $\text{Cl}^-$  ions, also HCl is a very strong acid that dissociates quickly to produce the aforementioned ions. Halogen as well as hydrogen ions are commonly used in general chemistry reducing agents.

Therefore, an HCl atmosphere can be interpreted as a reducing atmosphere. Applicant contests that Zhang ('857) does not teach an environment of 10ppm or less.

However, Zhang ('857) teaches a vacuum environment which inherently contains no oxygen concentration.

Therefore, Zhang ('857) teaches the aforementioned limitation of an environment of oxygen 10ppm or less (emphasis added).



**Conclusion**

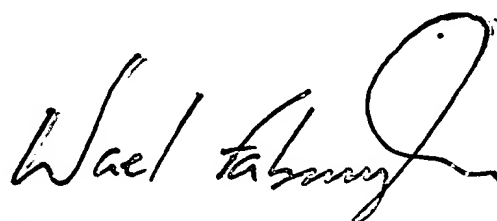
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando Toledo whose telephone number is (703) 305-0567. The examiner can normally be reached on Monday – Friday, 8am – 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

	Fernando Toledo Patent Examiner Art Unit 2823
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ft  
May 31, 2002



SUPERVISORY PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800